

CORRES CONTROL
OUTGOING LTR NO

88 RF 2389



Rocky Flats Plant
North American Space Operations
Rockwell International Corporation
P.O. Box 464
Golden, Colorado 80402-0464
(303) 966-7000

Rockwell
International

000024704

Contractor to U.S. Department of Energy

July 29, 1988

88-RF-2389

Albert E. Whiteman
Area Manager
DOE, RFAO

COMMUNITY RIGHT-TO-KNOW TOXIC CHEMICAL RELEASE REPORTING FOR 1988— DOCUMENTATION REQUEST

Ref: Letter dated 5 July 1988 from A. E. Whiteman to R. J. Erfurdt,
Community Right-To-Know Toxic Chemical Release Reporting for 1988

This letter is for the attention of B. L. Crist.

The Community Right-To-Know regulation requires facilities to report annually to the Environmental Protection Agency (EPA) their releases of toxic chemicals to the environment and to maintain records for three years supporting the basis of those estimates.

Enclosed is the formalized documentation you requested to support the estimates of releases to air, water, and land as well as off-site waste transfers and waste treatment methods/efficiencies for the 10 chemicals reported to the EPA on 1 July 1988. It is separated into the following categories:

1. Chemical Identification (which chemicals to report)
2. Air Releases
3. Water Releases
4. Land Releases
5. Off-site Waste Shipments
6. Waste Treatment Methods and Efficiencies

If you have any questions, please contact A. J. Petrocchi of my staff who coordinated the reporting and documentation efforts.

R. J. Erfurdt
R. J. Erfurdt, Director
Health, Safety, and Environment

Orig. and 1 cc - A. E. Whiteman
Enc.

Reviewed for Classification/UCNI/OUO
By: Janet Nesheim, Derivative Classifier
DOE, EMCBC
Date: 10-28-08
Confirmed Unclassified, Not UCNI/Not OUO

ADMIN RECORD

SW-A-003475

DIST	LTR	ENCL
SANCHINI, D. J.		
BADER, C. P.		
CAMPBELL, G. W.	X	
HOOD, R. C.		
KINZER, J. E.		
KIRBY, W. A.		
McNETT, J. F.		
MEYERS, G. W.		
SHANNON, W. M.		
SMITH, R. E.		
WEIDNER, C. W.		
WESTON, W. F.		
WILSON, G. L.		
WOZNIAK, B. D.		
YOUNG, E. R.		
ERFURDT, R. J.	X	
BETCHER, D. H.		
CARNIVAL, G. J.		
HARMAN, L. K.		
HEBERT, J. L.		
HOEY, J. B.		
HOFFMAN, R. B.		
KRIEG, D. M.		
LIM, B. W.		
LOUDENBURG, G. E.		
NAIMON, E. R.		
NEWBY, R. L.		
ROECKER, J. H.		
VELASQUEZ, R. N.		

CORRES. CONTROL	X
ANDERSON, S. A.	X
BAKER, R. C.	X
BATRICK, C. B.	X
CRACKER, R. T.	X
HOBBS, E. D.	X
LAMON, F. P.	X
LEWIS, T. F.	X
MCCARTHY, J. D.	X
PERCOCCHI, A. J.	X
SWANSON, C. L.	X
CLASSIFICATION	
UNCLASSIFIED	XX
CONFIDENTIAL	
SECRET	

AUTH. CLASSIFIER SIG
C. J. Nesheim
Class. in Reg. Admin.

DATE 07-29-88
IN REPLY TO LTR NO
2077-RF-88

DEC. TC 04222 X

LTR APPROVALS

J. J. Whiteman

JTE/cjp

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TOXIC CHEMICAL RELEASE REPORTING DOCUMENTATION
CHEMICAL IDENTIFICATION

TYPE OF DATA: Chemical Identification (which chemicals to report)
PREPARER: A. J. Petrocchi
DEPARTMENT: Rockwell HS&E Hazardous Materials Control
LOCATION: T452F
PHONE EXTENSION: 7007
DATE: 28 July 1988

DOCUMENTATION

SOURCES

1. Rocky Flats 1985/86 Plantwide Chemical Inventory
2. Vendor supplied Material Safety Data Sheets (MSDSs)

ASSUMPTIONS

EPA criteria for toxic chemical identification was to use 1987 data for 1988 reporting. However, in EPA's preamble for the final rule implementing this reporting requirement (40 CFR 372, Federal Register, 16 February 1988, p. 4510), EPA's guidance on identification of which chemicals to report was "...use the best available information at hand..." and "...use readily available data..." (emphasis added).

Since our 1985/86 Plantwide Chemical Inventory was the most recent inventory available and since our operations change slowly, the assumption was made that this inventory reasonably represented our chemical usage in 1987 as well. Rockwell and DOE/RFAO counsel were advised of this on 6 June 1988 and verbally agreed that the 85/86 inventory was the best available information at hand to use.

PROCEDURES

The Toxic Chemical (TC) List from 40 CFR 372 represented those chemicals requiring reporting if their usage exceeded defined thresholds.

The regulation exempted chemicals used for the following categories: laboratories, warehousing (storage only), custodial/grounds upkeep operations, and vehicle maintenance. Therefore, chemicals used in these operations were excluded from consideration.

The computerized Rocky Flats 1985/86 Plantwide Chemical Inventory was used as the basis to identify those chemicals exceeding the 1987 usage threshold of 10,000 lbs. or the manufactured/processed threshold of 75,000 lbs.

Vendor supplied MSDSs were used to identify chemical components on the TC List in approximately 1200 tradename mixtures. Since the MSDSs were not computerized, these were searched by hand.

Roughly 33% of the MSDSs (400) could not be found in spite of an aggressive campaign begun in September 1986 and lasting for several months to request them from vendors. This was due in part (21%) to vendor non-response despite

TOXIC CHEMICAL RELEASE REPORTING DOCUMENTATION: CHEMICAL IDENTIFICATION

28 July 1988

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several follow-up requests, vendors out of business, and discontinued products. It was also due in part (12%) to MSDSs filed under different names than were listed in our inventory. This "misfiling" occurred most often because of a name discrepancy between the product label from which our inventory was generated and the name on the MSDS by which it is filed in our MSDS master files. In essence, the product label/MSDS link was broken. In some cases, Rocky Flats chemical owners reported the chemical name incorrectly. This is corrected when found. In other cases, the vendor's chemical name was different between the product label and the MSDS. Although we try where possible to make adjustments for this, name consistency between product label and MSDS is the vendor's responsibility as expressed in OSHA's Hazard Communication Standard.

The "missing" MSDSs were considered to be neither "at hand" nor "readily available" as mentioned in the "ASSUMPTIONS" section earlier.

Some annual usage data was not reported in the 85/86 inventory although it was requested. Since no regulation existed mandating tracking annual usage data at the time the 85/86 inventory was taken, it was not pursued when it was missing from an owner's report. Again, this was "the best available information at hand". However, for those chemicals which were close to exceeding the threshold quantity for reporting, calls were made to those owners not reporting annual usage data in an effort to get that data.

CALCULATIONS

All calculations for determination of which chemicals to report were simple addition of the quantities for each chemical with two exceptions. Some unit conversions had to be made, for example to convert volumetric quantities to gravimetric since all quantities were to be reported in pounds. This involved using a volumetric to gravimetric conversion factor such as specific gravity, density, or pounds per gallon. In addition, for mixtures, a percentage factor for an ingredient on the TC List was used to arrive at the quantity of that TC chemical as a component in the mixture.

JUL 28 1988

AIR RELEASE DATA, SARA TITLE III, SECTION 313

Robert J. Crocker
Environmental Management, T452B
Extension 2090

Data documentation for Community Right-To-Know toxic chemical releases are included in the following report. This includes the 10 chemicals that have been identified as exceeding the de minimus cut-off (10,000 lbs/yr) level for Section 313 reporting.

Raw data used for compiling this data reporting were obtained from the Rocky Flats Chemical Inventory (1986).

I AMMONIA:

Primary source location- 400 complex

BLDG. 444 - Total annual use was 2000 lbs. Based on process knowledge, the assumption was made that 50% of the ammonia was consumed/or changed in the various processes. Assumptions based on limited information provided by process users.
Reported value: 1000 lbs.

BLDG. 441 - Total annual use: 600 lbs.
(Blue print machines)
Assumed 25% ammonia consumed in process, reported 75% release to atmosphere.
Reported value: 450 lbs.

TOTAL REPORTED RELEASE FROM POINT-SOURCE LOCATIONS: 1,450 lbs/yr.

FUGITIVE RELEASES (non-point sources) - Various small users around Plant site are believed to release small amounts (<100 lbs./yr.). (laboratories, Mcte. operations, etc.)

II CARBON TETRACHLORIDE: Annual solvent usage is approximately 14,000 gallons.

This solvent is used mostly as a cleaning agent within the 700 complex. Historical data from liquid waste samples have shown process waste leaving the 700 complex buildings to contain approximately 30% solvents. Although analysis were not specific for carbon tet., process knowledge indicates that this is the major

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solvent used in these areas. For the purposes of this report, the assumption was made the 30% solvent loading in the liquid waste streams was carbon tet. The estimated amount of carbon tet. leaving these buildings (as liquid) was 4,000 gallons per year.

ESTIMATED RELEASE TO THE ATMOSPHERE:

REPORTED 9,958 gal/yr. x (13.30 lbs/gal) = 132,447 lbs/yr.

III HYDROGEN FLUORIDE

Annual usage is approximetly 10,400 lbs/yr.

As per conversations with process operators, 99% of the HF is chemically changed in the process operations ($\text{Pu} + \text{HF}_4 = \text{PuF}_4$). Thereby, 1% of the annual usage was reported as released to the ambient air. Since this value is expected to be very low (~100 lbs/yr), based on process knowledge, the range columns (A.1) were used on the Reporting Forms. Since the HF cylinders are stored in a shed with no central ventilation system, the fugitive source category was used for this estimated release. Occational venting and bleeding-off of these storage cylinders is accounted for in the fugitive column.

Both of these categories are reporting ranges, with values between 1-499 lbs/yr.

Point source release estimate - 104 lbs/yr

Fugitive source release estimate - < 100 lbs/yr

IV FREON 113

Approximately, 10,000 gallons of Freon 113 are used on an annual basis. Since the original completion of Form R, a more refined look at the data has indicated an over-estimation on the amount of Freon released to ambeint Air. For most of the sources it was assumed that 80% of the compound was released to the atmosphere. The other 20% becomes tied up in liquid wastes, or changes form chemically (oxidation, etc.)

ORIGINAL REPORTED QUANTITIES: released to Air

Point-source emissions 9,109 gal/yr x (13.16 lbs/gal)
= 119,874 lbs./year

Fugitive emissions - 3,881 lbs/yr

REVISED ESTIMATES (7/27/88): 8,000 gal/yr x (13.16) lbs/gal)
(point-sources) = 105,280 lbs./year

Fugitive emissions are unchanged.

V HYDROCHLORIC ACID

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The Rocky Flats Chemical Inventory (1986) indicates that the majority of this acid is used in buildings 771, 444, and 374. Caustic scrubbers are in place for all these major point sources, an estimated scrubber removal efficiency of 80% was used for all acid control devices. This is a conservative estimate based on general industry knowledge. Estimated releases from Point Source locations is 30,191 lbs/yr. Low levels of fugitive releases are expected from storage tanks and transportation systems. The Reporting Range (A.1) column was used to account for these releases because the values are felt to be low (< 100 lbs/yr), and highly variable.

Reported release to Air (point-source): 30,191 lbs/yr

VI NITRIC ACID

This acid is used mostly in the 400 complex, buildings 771, and 374 for dissolution/ion exchange, and plating operations. The major point-sources have caustic scrubbers, whose efficiency was estimated at 80%. Process knowledge provided by users indicate "most" of the Nitric acid in these operations is consumed and or changed chemically (metallurgical plating operations, etc.). Therefore, the assumption was used that 2% of the acid used at major process sources was released into the ambient air.

The various nitric acid storage facilities (tank farm, etc.) collectively hold 220,350 gallons; the assumption was made that 1% of this total escaped as fugitive emission releases.

Point-source release estimate - 30,837 lbs/year
Fugitive release estimate - 27,588 lbs/year
(12.52 lbs/gallon)

VII PHOSPHORIC ACID

Relative to other acid compounds used on Plant Site, small amounts of Phosphoric acid are in use, mainly in the 400 complex. Process knowledge by the users indicate that "most" of the acid is consumed by various chemical reactions (plating/chemical milling, etching, etc.). The assumption was made that 2% of the 1,065 gallons used annually are released to the atmosphere.

**Reported release estimate - $1,065 \times (13.2 \text{ lbs/ga}) \times 2\%$
= 280 lbs/year**

VIII SODIUM HYDROXIDE

Approximately 178,000 gallons of sodium hydroxide is shown by the chemical inventory as stored annually in tanks on plant-site.

Under static conditions, the non-volatile sodium hydroxide is not released to the atmosphere. Since there is a possibility that small amounts of this chemical can be emitted as a particulate, or mist (cooling towers, etc.), the Reporting Range Column was used to account for these releases. The release amounts are not expected to exceed ~100 lbs/yr. No fugitive sources were identified for this chemical.

XI SULFURIC ACID

Sulfuric acid is used mostly in the 400 complex, and in building 771. Most of the larger sources have caustic scrubbers for removal of acid fumes. A 80% scrubber efficiency factor was used for release calculations. Approximately 43,000 gallons of this acid is used annually on plantsite; 3780 gallons of which is believed to be bound up with liquid wastes (cooling water ph control, etc.).

Small amounts of acid may vent during storage and transportation, which are accounted for in the fugitive emissions Reporting Ranges columns. Fugitive releases are variable, but not expected to exceed 100 lbs/yr.

Reported estimated point-source release to Air: 1419 lbs/yr

X 1,1,1 TRICHLOROETHANE

Approximately 100,825 lbs/yr of trichlorethane are used at point-source locations around plant-site (annually). Based on process knowledge, 20% of this total was assumed to be tied up with liquid waste. The remaining 80,660 lbs. was reported as released to the ambient air.

Ninety gallons (993 lbs.) were estimated as released from various small fugitive sources (cleaning by maintenance personnel, etc.).

Reported release for point-sources - 80,660 lbs/year

Reported release for fugitive sources - 993 lbs/year

REC'D JUL 28 1988

DATA USED TO COMPLETE TOXIC CHEMICAL RELEASE FORMS FOR RELEASES
TO LAND

- 1) Estimates of releases of the ten identified chemicals to land were made by Rick Lawton, Rockwell International, Environmental Management, Building T452B, extension 966-7079.
- 2) Environmental Protection Agency publication EPA 560/4-88-002 identifies four pathways for releases to land of toxic chemicals.

Landfill - none of the ten chemicals are allowed to be sent to the landfill. This is administratively controlled. Procedural documentation is found in the Health, Safety, and Environment Manual, Chapter 21.01, "Disposal of Excess Chemicals, Waste Oils, and Organic Solvents".

Land Treatment/Application/Farming-Land treatment is not practiced in any form at RFP.

Surface Impoundment (to be closed as a landfill) - no impoundments to be closed as landfills exist at RFP.

Other Disposal - spills are the pathway of concern for the ten identified chemicals to be released to land. Records for calendar year 1987 indicate none of the ten chemicals were spilled exterior of buildings or in land areas without impermeable containment. These records are maintained in the Environmental Management office on a computer and summarize spill incidents.

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EPA FORM R - TOXIC CHEMICAL RELEASE INVENTORY REPORTING FORM

DATA I.D.: OFFSITE SHIPMENTS

PREPARED BY: R. C. BAKER
WASTE COMPLIANCE AND PLANNING
BUILDING 776
x 2698

SOURCES: UNIFORM HAZARDOUS WASTE MANIFESTS
WASTE PROCESSING REQUEST FORMS
WASTE STREAM IDENTIFICATION AND CHARACTERIZATION
DOCUMENTS
VISUAL INSPECTION OF SAMPLES

ASSUMPTIONS: 1,1,1 - TRICHLOROETHANE = 10.6 lbs./gal.

FREON 113

SOURCES: UNIFORM HAZARDOUS WASTE MANIFESTS NOS. 00378900,
00378001, 00378002
WASTE STREAM IDENTIFICATION AND CHARACTERIZATION,
AREA 1, BUILDING 460

CALCULATIONS: 5640 lbs.
10900 lbs.
10670 lbs.
27210 lbs. x 5ppm = 0.136 lbs.

1,1,1 - TRICHLOROETHANE

OFFSITE LOCATION NO. 1

SOURCES: UNIFORM HAZARDOUS WASTE MANIFESTS NOS. 41542, 42366

CALCULATIONS: 1031 lbs.
290 lbs.
1321 lbs. x .8% = 10.57 lbs.

OFFSITE LOCATION NO. 2

SOURCES: UNIFORM HAZARDOUS WASTE MANIFEST NO. 90
WASTE PROCESSING REQUEST FORMS NOS. 87408.1 & .2,
87627.1-.4
VISUAL INSPECTION OF SAMPLES

ASSUMPTIONS: 1,1,1 - TRICHLOROETHANE = 10.6 lbs./gal.

CALCULATIONS:
110 gals. x 80% = 88 gals. x 10.6 lbs./gal. = 932.8 lbs.
200 gals. x 1% = 2 gals. x 10.6 lbs./gal. = 21.2 lbs.
954.0 lbs.

JUL 27 1988

I. WASTE TREATMENT METHODS AND EFFICIENCIES
(EPA Form R, Part III, Section 7)

A. Prepared by: Scott A. Anderson
Waste Compliance and Planning
Building 776
Ext. 5557

II. GENERAL NOTES AND REFERENCES (COVERS STATEMENTS GENERAL TO ALL 10 LISTED CHEMICALS)

A. SOURCES

- II-1. Paul Graham
U.S. EPA, Region VIII
(303)293-1730
- II-2. Garv Hewitt
Liquid Waste Ops.
Building 374
Ext. 5088
- II-3. Frank McMenus
Liquid Waste Ops.
Building 774
Ext. 7729
- II-4. Waste Stream Identification and
Characterization (WSIC), Rockwell
International/R.F. Weston, April 6, 1987
- II-5. Rocky Flats Chemical Inventory Database
(RFCI), Rocky Petrocchi, Hazardous Material
Control, May 2, 1988
- II-6. Toxic Chemical Release Inventory Reporting
Form R and Instructions, EPA 560/4-88-005,
U.S. EPA, March 1988

B. ASSUMPTIONS, PROCEDURES AND CALCULATIONS

1. Treatment method codes not specifically listed in Ref. II-6.:
- A07 = Building filtration, no removal
P99 = Container storage, drums
F99 = Evaporation & Spray drier, Bldg. 374
2. Any waste streams (building contributions) which fell within concentration ranges already reported for a particular chemical were not reported separately, but were grouped in the previously listed concentration range.
3. Contact with U.S. EPA, Region VIII (Ref. II-1.) on 06/06/88:

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- Stack releases should be reported as filtered releases with 0% removal efficiency (treatment code A07).
- Drum storage is not considered a treatment method, therefore, solids and liquids stored in drums prior to offsite shipment have "N/A" listed under treatment method.
- If treatment method is "N/A", influent concentration does not need to be reported

4. Waste streams on plantsite are either liquid, solid, or gaseous. Liquid wastes consist of aqueous or organic streams. There are essentially two treatment facilities concerned with treatment of the Section 313 listed chemicals. Liquid - Building 774 - Treats aqueous and organic waste. Aqueous waste treated comes from Building 771. The aqueous waste undergoes neutralization and precipitation. Additionally, some other aqueous wastes are directly cemented. Organics are directly cemented. Building 374 - Essentially treats only aqueous streams. Treatment steps include neutralization, precipitation, filtration, evaporation and spray drying. The attached diagram gives the general flow for liquid wastes. Solid - solid waste streams (mostly composed of kimpipes, etc.) are drummed and stored for offsite incineration.

5. Neutralization efficiency - Bldg. 374, 774

Typical aqueous solution received with a pH = 5.0
(range = 4.0 - 7.0) (Ref. II-2. and II-3.)

Typical target point pH = 12.0 - 13.0

By definition: $\text{pH} = -\log [\text{H}^+]$
where $[\text{H}^+]$ = concentration of H^+ ions

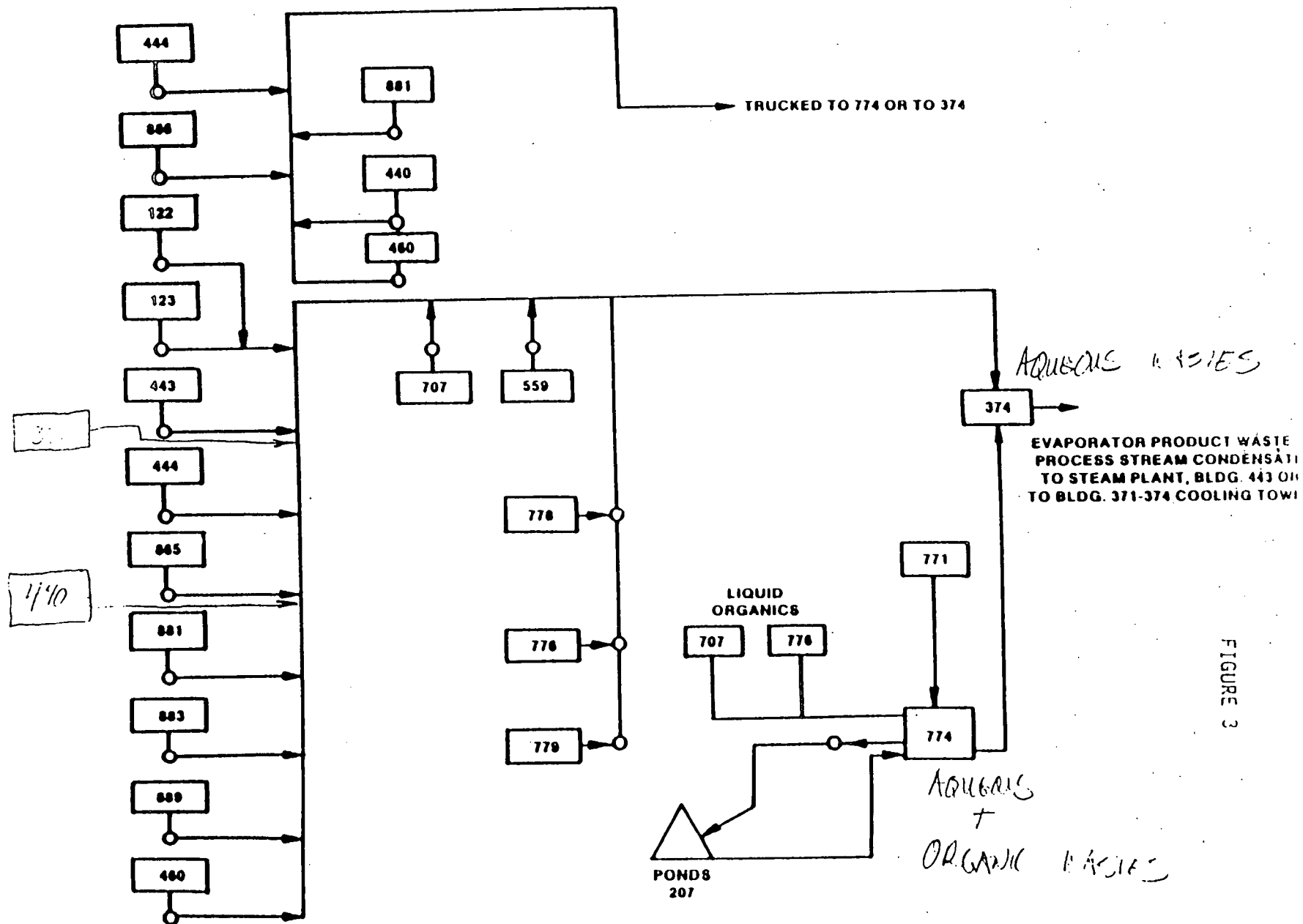
$$[\text{H}^+]_{\text{initial}} = 10^{-\text{pH}} = 10^{-5.0} = 1 \times 10^{-5} \text{ M}$$

$$[\text{H}^+]_{\text{final}} = 10^{-12.0} = 1 \times 10^{-12} \text{ M}$$

$$\begin{aligned} \text{Treatment efficiency} &= \frac{1 \times 10^{-5} - 1 \times 10^{-12}}{1 \times 10^{-5}} \times 100 \\ &= 100\% \end{aligned}$$

6. Solidification efficiency - Bldg. 774

Since the waste form changes from liquid to solid (physical removal) the waste treatment efficiency must be considered 100%.



ORGANIC AND AQUEOUS PROCESS TRANSFER PIPING AND DRUM TRANSFER DIAGRAM

FIGURE 3

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7. Other treatment codes from Ref. II-6.:

G01 = Cementation process
C11 = Neutralization
C01 = Chemical precipitation - Lime or NaOH
P12 = Filtration
A03 = Scrubber

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III. SPECIFIC CHEMICAL METHODS

AMMONIA, ANHYDROUS

1. SOURCES

III-1. Forrest Lundberg
Tool Engineering
Building 444
Ext. 2494

III-2. Estimating Releases and Waste Treatment Efficiencies for the Toxic Chemical Inventory Form, EPA 560/4-88-002, U.S. EPA, Dec. 1987.

2. ASSUMPTIONS, PROCEDURES AND CALCULATIONS

Buildings where chemical is utilized: (Ref. II-5.)

439 - Remote Engr.
441 - Office
444 - Production
460 - Production

- o Ammonia no longer used in 444 building - process eliminated
- o Ammonia utilized in Bldgs. 439, 441 and 460 in blueprint machines
- o Releases and treatment apply to fugitive and point emissions

Exhaust fan on machine exhausts at approx. 600 cfm (EST.) (Ref. III-1.)

$$\begin{aligned}\text{specific gravity ammonia} &= .6 \times .0808 \text{ lb/ft}^3 \text{ air} \\ &= 0.048 \text{ lb/ft}^3 \\ &\text{(Ref. III-2.)}\end{aligned}$$

$$\begin{aligned}\text{Inventory} &= 10 \text{ lb/yr} / 0.048 \text{ lb/ft}^3 = 206.3 \text{ ft}^3/\text{yr} \\ &\text{(Ref. II-4.)}\end{aligned}$$

Assuming 250 working days per year (8 hr. day):

$$\begin{aligned}600 \text{ cfm} \times 60 \text{ min/hr} \times 8 \text{ hr/day} \times 250 \text{ day/yr} \\ = 7.2 \times 10^7 \text{ ft}^3/\text{yr}\end{aligned}$$

$$\text{Concentration} = \frac{206.3 \text{ ft}^3/\text{yr}}{7.2 \times 10^7 \text{ ft}^3/\text{yr}} \times 10^6 \text{ ppm} = 2.9 \text{ ppm}$$

- o Treatment efficiency = 0% since the exhaust is filtered but no specific removal mechanism for ammonia is present.

III. SPECIFIC CHEMICAL METHODS

CARBON TETRACHLORIDE

1. SOURCES

III-3. G.A. Mosler
Mod. Center
Building 440

III-4. J.P. George
Utilities
Building 707
Ext. 2363

2. ASSUMPTIONS, PROCEDURES AND CALCULATIONS

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Building where chemical is utilized: (Ref. II-5.)

439 - Remote Engineering
460 - Production
701 - Maintenance
707 - Production
776 - Production

o CCl_4 is no longer used in Bldg. 439 - use of TCA instead (Ref. III-3.)

o Building 460: Solid waste (kimwipes) contaminated with CCl_4

Concentration = $300 \mu\text{g/kg} / 10 \text{ mg}/\mu\text{g} = 0.3 \text{ mg/kg}$
= 0.3 ppm

o Building 701: Release via hood exhaust, CCl_4 evaporated

10 lb/yr used (Ref. II-5.)

100 mscf/yr exhaust (Ref. II-4.)

SPECIFIC GRAVITY = 1.59 = 99.2 lb/ft^3
(Ref. III-2.)

therefore, $10 \text{ lb/yr} / 99.2 \text{ lb/ft}^3 = 0.101 \text{ ft}^3/\text{yr}$ used

concentration = $(0.101/100 \times 10^6) \times 10^6 \text{ ppm}$
= 0.00101 ppm = 1.01 ppb

o Building 707 - release via stack exhaust

Total 707 use = 525 gal + 525 gal + 11200 gal +
350 gal + 350 gal + 525 gal + 525 gal =
140,000 gal/yr (Ref. II-5.)

50% is volatilized (very conservative assumption),
therefore approx. 70,000 gal/yr out the stack

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III. SPECIFIC CHEMICAL METHODS

CARBON TETRACHLORIDE (cont.)

density = 99.2 lb/ft³ (from previous calcs.)

70,000 gal/yr / 7.481 gal/ft³ = 936 ft³/yr volatilized

exhaust rate = 1500 cfm (EST., Ref. III-4.)

$$\text{concentration} = \frac{936 \text{ ft}^3/\text{yr}}{1500 \text{ ft}^3/\text{yr}} \times \frac{\text{hr}}{60 \text{ min}} \times \frac{\text{day}}{8 \text{ hr}} \times \frac{\text{yr}}{250 \text{ day}} \times 10^6 \text{ ppm}$$

= 5.2 ppm

- o Building 707 - release via liquid streams

assume remaining 70,000 gal/yr is used in process

composite quantity = 150,000 gal/yr (Ref. II-4., waste no. 13750)

$$\text{concentration} = \frac{70,000}{150,000} \times 10 \text{ ppm} = 470,000 \text{ ppm}$$

- o Building 776 - Liquid

assumed same concentration as 707 liquid

III. SPECIFIC CHEMICAL METHODS

FREON

1. SOURCES
none additional to those previously listed
2. ASSUMPTIONS, PROCEDURES AND CALCULATIONS

Buildings where chemical is used: (Ref. II-5.)

121	453	771	885
334	460	776	
371	662	778	
440	707	865	
444	770	881	

- o Air releases - Stack exhaust

Building 121 - Quantity used = 150 gal/yr
(Ref. II-5.)

$$= 150 \text{ gal/yr} / 7.481 \text{ gal/ft}^3 = 20.1 \text{ ft}^3/\text{yr}$$

Exhaust = 100 mscf/yr (Ref. II-4.)

then,
$$\frac{20.1 \text{ ft}^3/\text{yr}}{100 \times 10^6 \text{ ft}^3/\text{yr}} \times 10^6 \text{ ppm} = 0.201 \text{ ppm}$$

All other building concentrations are assumed to be in this range. (Actually, production building ventilation rates are expected to be somewhat higher than in 121, thus, the concentration should be somewhat less.

For example: Building 444

Building exhaust = 100,000 cfm = $1.2 \times 10^{10} \text{ ft}^3/\text{yr}$
(Based on 8 hr/day, 250 day/yr)

Building freon use = 400 gal/yr = $53.5 \text{ ft}^3/\text{yr}$
(Ref. II-5.)

$$\begin{aligned} \text{Concentration} &= \frac{53.5 \text{ ft}^3/\text{yr}}{1.2 \times 10^{10} \text{ ft}^3/\text{yr}} = 4.5 \times 10^{-9} \times 10^6 \text{ ppm} = \\ &= 4.5 \text{ ppb} \end{aligned}$$

- o Some liquid (organic) streams are collected in authorized areas, then transferred to hazardous waste storage site for shipment. In this case, treatment method is N/A, since we do not treat this waste. (Bldg. 334, 371, 440, 444, 460, 662, 707, 885).
- o Other liquid streams are transferred to Bldg. 774 for cementation:

~~Bldg. 444 Waste no. 14810 Conc. 3×10^{-6} pg/l~~

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III. SPECIFIC CHEMICAL METHODS

FREON (cont.)

Bldg. 444 Waste no. 14610 Conc. = 3×10^6 $\mu\text{g/l}$
= 3000 mg/l
= 3000 ppm

Bldg. 453 Waste no. 11120 Conc. = 8400 $\mu\text{g/ml}$
= 8400 ppm
Waste no. 11170 Conc. = 490,000 $\mu\text{g/ml}$
= 490,000 ppm

Bldg. 707 Waste no. 13700 Conc. = 92,000,000 $\mu\text{g/kg}$
= 92,000 ppm

(Ref. II-4.)

- o Aqueous streams are transferred to Bldg. 374

Bldg. 444 Waste no. 14700 Conc. = 140 $\mu\text{g/l}$
= 0.14 ppm

(Ref. II-4.)

- o Solids do not undergo treatment onsite (kimwipes, etc.), therefore treatment method N/A.

III. SPECIFIC CHEMICAL METHODS

TRICHLOROETHANE (TCA)

1. SOURCES

none other than those previously listed

2. ASSUMPTIONS, PROCEDURES AND CALCULATIONS

Buildings where chemical is used: (Ref. II-5)

334	453	881
440	460	883
443	707	885
444	770	903T
447	777	

- o Building 770 - TCA is no longer used, Freon is used instead

- o Buildings 885 and 903T have very infrequent use of this chemical, therefore they were not included in these calculations.

- o Building 334 - waste no 07620 - liquid

concentration = 32,000,000 $\mu\text{g/kg}$ = 32,000 ppm

this waste is shipped to hazardous waste storage (drum storage) thus waste treatment method is N/A.

- o Building 440 - composite waste no. 01680 - this is also transferred to haz. waste storage, thus treatment method is N/A.

- o Building 443 - liquid - waste no. 00310 to drum storage, treatment method is N/A.

- o Building 444 - liquid - waste no. 14510 to drum storage, treatment method is N/A.

- o Building 447 - aqueous - waste no. 14660

concentration = 6.0 $\mu\text{g/l}$ = .006 ppm = 6 ppb
(Ref. II-4.)

- o Building 453 - liquid - waste no. 11120

concentration = 200 $\mu\text{g/ml}$ = 200 ppm
(Ref. II-4.)

- o Building 460 - aqueous - waste no. 01760

concentration = 160 $\mu\text{g/l}$ = .16 ppm
(Ref. II-4.)

- o Building 707 - organic - waste no. 13750

concentration = 15,000,000 $\mu\text{g/kg}$ = 15,000 ppm

III. SPECIFIC CHEMICAL METHODS

TRICHLOROETHANE (cont.)

(Ref. II-4.)

- solid - waste treatment N/A
drum storage

- o Building 777 - waste no 12230 - organic
concentration >1% since pure TCA (with
impurities) is sent to 774 building for
solidification.
- o Building 881 - composite waste no. 05250 - aqueous
concentration = $120 \mu\text{g/l} = .12 \text{ ppm}$
(Ref. II-4.)
- o Building 883 - waste no. 04880 - organic
concentration = $2,400,000 \mu\text{g/l} = 2400 \text{ ppm}$

20/21

Reviewing: Eric C. Pearson
Official: Eric C. Pearson
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